Operational Testers Use Net-Centric Tools to Test Net-Centric Systems

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The U.S. Department of Defense (DoD) is attempting to field warfighter capabilities faster, within a tighter budget, and with less impact on the operational users. Concurrently, the DoD is also moving to a net-centric environment enabling information and service collaboration across the global information grid, requiring new and innovative ways to conduct operational tests (OT). Joint Interoperability Test Command (JITC) testers are utilizing some of these new collaboration capabilities provided by the Defense Information Systems Agency to reduce costs, increase flexibility, reduce warfighter support requirements, and improve quality during OTs for net-centric systems.

Net-centric systems and services typically consist of strategically located applications and/or authoritative data sources, which provide capabilities to users via the unclassified and classified DoD networks. These systems may or may not include client-side applications, but many require nothing more than access permissions and a traditional web browser to use. Users access the capabilities from their duty locations or from wherever they have connectivity. One example of such a system is the Global Combat Support Systems–Combatant Command/Joint Task Force (GCSS-CC/JTF), which provides logistics situational awareness, decision support, and visualization tools to combatant commands and Joint Task Force commanders.

A net-centric system OT requires genuine operational users to exercise the system under test in a manner consistent with its intended use to support a variety of user missions. This is normally achieved by users accessing the system and executing a series of operationally realistic scenarios while data collectors observe and record the activities of the users. This requires extensive data collector travel to operational user locations and a very structured and rigid schedule for warfighter participation. The flexibility to accommodate unanticipated users at new locations or to make last-minute schedule changes is significantly hindered by having to physically colocate data collectors at each user location, mainly because of travel arrangements, visit requests, and resource allocations and reservations. Time and resources are also wasted when users are not available as scheduled, and data collection opportunities are lost when unanticipated users became available at the last minute.

Net-Centric Enterprise Services offers collaboration technologies through Button One (E-Collab Center) and Button Two, Defense Connect Online (DCO) tools. Either tool provides the ability to conduct collaboration events such as meetings or document reviews and offers voice over-internet protocol (VOIP) services, video (webcam), and the ability to share documents and a computer screen over the global information grid. Both tools enable varying degrees of control by the meeting organizers and are customizable to maximize collaborative efforts. The ability to record these meetings and the VOIP and screen-sharing capabilities is the keystone attribute that enabled JITC to utilize these tools for OT.

JITC incorporated DCO as part of their test strategy in conducting the GCSS-CC/JTF v7.0 OT. JITC orchestrated activities, collected data, and observed operational users remotely using DCO-provided capabilities over the classified network. The testers were located at the JITC Headquarters in Arizona while the various users participated from their desktops at the following locations:

- Defense Information Systems Agency Sky 7, Virginia;
- Joint Forces Command, Virginia;
- Central Command, Florida;
- Pacific Command, Hawaii;
- Special Operations Command, Florida;
- Transportation Command, Illinois; and
- The Pentagon, Virginia.

The major shift in test conduct enabled users to participate from their actual classified workstation, which minimized the impact on the users and increased the scope of operational environment available for testing.

Another benefit allowed stakeholders such as the Director, Operational Test & Evaluation, and the

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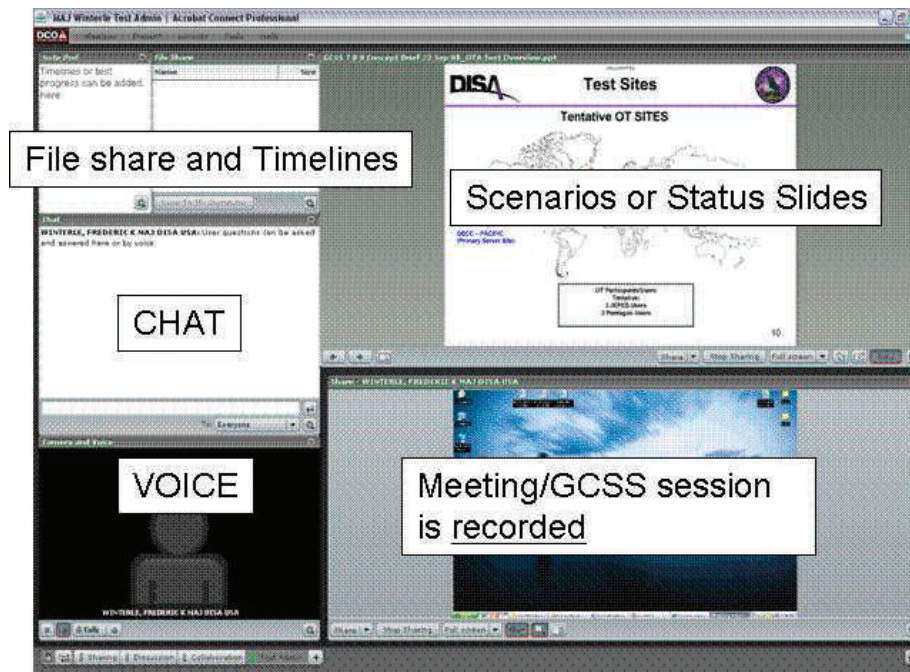| 16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
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Figure 1. Defense Connect Online Test Administrator Screen. The test administrator opens individual meetings for each participant/ user. The user shares his/her screen while using the Global Combat Support Systems–Combat Command/Joint Task Force. Using the record function, we eliminate the need for screen capture instrumentation.

Program Management Office representatives to observe the testing via DCO from their classified desktop at their respective locations. In one case, a conference room was set up to show the DCO session on a wall screen to facilitate group discussion and participation.

Testers organized and created the DCO sessions for each user to enable easy and consistent identification using the DCO web interface. Users were then able to share their screens when given the "presenter" role by the meeting hosts. Observers were limited to monitoring and chat functions to help prevent them from unintentionally interrupting the test process. Testers scheduled sessions with users as they were available, then distributed the session schedules and the DCO universal resource locator to all stakeholders for each event. The same user sessions were used for the duration of the test to consolidate all user recordings under the same universal resource locator for later reference. The testers posted downloadable operational scenarios, surveys, test incident report forms, and other test documents through the DCO file share pod. This made all test documentation instantly available to all users when needed and ensured a common tool set among users and testers.

Users shared their desktops while using GCSS-CC/ JTF to perform test scenarios, which enabled everyone monitoring the session to observe as the users performed various activities with the GCSS-CC/JTF

system. *Figure 1* is an example of the test administrator's screen. Using the session record function of DCO, testers eliminated the need for external screen capture tools or instrumentation.

Figure 2 is an example of the data collectors' screens while monitoring and capturing the actions of multiple users. The data collector can monitor one or more users at a time. The data collector starts a separate session/ test event as users become available. While monitoring, the data collector can follow along as the user steps through the scenarios.

The Test Administrator can

- monitor or report scenario completion by a user,
- field questions by users,
- run a test log,
- gather timeliness data from users in real time, and
- monitor test incident problem reports (TIPRs) and log calls to help desk.

In a separate DCO session, the Test Administrator can

- conduct daily hotwashes and
- run a data authentication group.

Testers controlled the test events using the VOIP and text chat functions. Testers used these functions to provide the user with instructions and to answer questions. The tester used the recording feature to
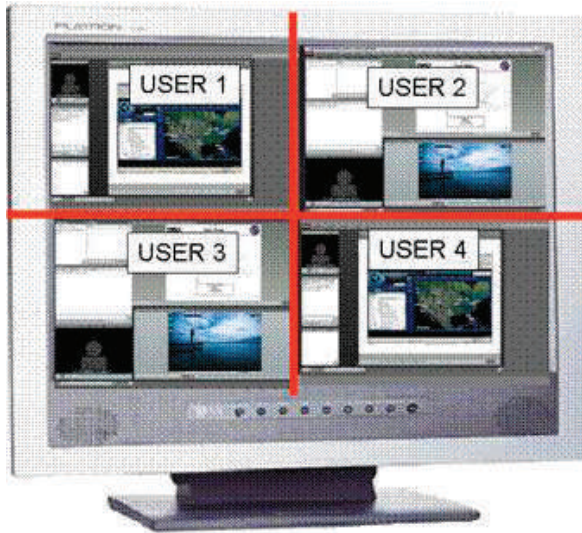
Figure 2. Test administrator screen monitoring multiple users.

capture video and VOIP data for each test event, allowing later replay of results and the capturing of error messages, user errors, or any significant event for further analysis or troubleshooting by the test team during data reduction or by the developer in identifying potential problems.

There were obvious benefits using the DCO collaboration tool in the execution of the GCSS-CC/JTF test, with cost reduction benefits being the most measurable. By executing the test remotely, JITC saved approximately $60,000 in labor and travel costs of the $140,000 estimated for test execution. Employing centralized data collection increased test flexibility for accommodating unanticipated users/locations and last-minute schedule changes by eliminating the need to physically colocate data collectors with each user. The ability to reschedule enabled unanticipated users to be easily accommodated into the test event or enabled planned users to reschedule as needed because of test schedule changes or user availability. The ease and speed of rescheduling and adaptability to last-minute changes resulted in the conservation of resources and overall timesaving, with no loss of data collection.

Test cost, time, and resources were reduced by employing multiple, simultaneous DCO sessions, which enabled one data collector to monitor multiple users/test events at the same time from his/her desktop at a centralized location. Users no longer had to spend time taking and saving screenshots to support data collection needs. The DCO session recordings captured the user actions and the system responses throughout the test, resulting in a visual record of all activities and all anomalies. The ability to review the recordings assisted with authenticating test data by verifying user inputs at the time of recorded system errors. The Program Management Office, having access to the recording, could assist in determining the possible root causes of any system errors found and in developing the necessary fixes.

To ensure success when using collaboration tools for testing, the following preparations should be in place.

- Ensure maximum network connectivity during the test window:
  - o ensure system administrator support is available outside of normal duty hours, and
  - o rehearse actions on disconnection from the network.

- Ensure users have headsets and can use them on their classified network:
  - o allow hands-free communication with the data collector, preventing the need to switch applications to use a chat tool.

- Minimize the number of simultaneous users with each data collector:
  - o data collectors can better focus on user questions and actions, and
  - o multiple or larger monitors can assist in maximizing data collection if multiple users must be monitored by a single data collector.

Utilizing the Net-Centric Enterprise Services collaboration tools in executing the GCSS-CC/JTF OT reduced cost by approximately $60,000, increased the ability to incorporate schedule or other changes, and maximized data collection opportunities. The biggest advantage was the improvement of test data, in quality and quantity, by using the recording function and facilitating the warfighter's ability to participate.

Operational test community strategies must explore new and existing technologies, such as the Net-Centric Enterprise Services collaboration tools, to keep pace with accelerated acquisition programs that are trying to field improved capabilities to the warfighter community. ❏

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